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PLANT

HARDINESS

ZONE MAP

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PLANT HARDINESS ZONE MAP

Prepared by the U.S. National Arboretum, Agricultural Research Service, U.S. Department of Agriculture in cooperation with the American Horticultural Society¹

This map shows in moderate detail the expected minimum temperatures in most of the horticulturally important areas of the United States (excluding Alaska and Hawaii) and Canada. It shows 10 different zones, each of which represents an area of winter hardiness for certain ornamental plants.

Cold hardiness zones for the United States area of this map are based on isotherms of average minimum winter temperatures for the years 1899 through 1938. Readjustments were made for 34 States on the basis of January mean minimum temperatures for 1931 through 1952, as published by the U.S. Weather Bureau.

Data for the adjacent area in Canada were provided by the Canadian Meteorological Division, and are based on a 20- to 40-year period.

Data from both sources in the United States and Canada have been modified or reinterpreted in many localities to conform with recent and more detailed information provided by State experiment stations and numerous individual cooperators.

HOW TO USE THE MAP

Each zone of the map on the reverse side has been subdivided into dark-colored and light-colored sections that represent 5-degree differentials within the 10-degree zone. The lighter color of each zone represents the colder section; the darker color, the warmer section. The accompanying table lists representative plants that normally survive in each zone.

The ten hardiness zones should be appropriate for most general reference purposes. However, plant survival differences can be noted at smaller north-south progressions than a full zone represents. When this additional detail is needed, use the 5-degree differentials within the 10-degree zone.

Some examples of these differences are as follows: Saucer magnolia (*Magnolia soulangeana*) and wisteria (*Wisteria sinensis*) are suitable for

¹ Based on studies conducted by a commission of the Society (formerly the American Horticultural Council) upon recommendation of the American Association of Nurserymen. Further background information may be found in an article titled, *The Geographic Charting of Plant Climatic Adaptability*, by H. T. Skinner, 15th Internatl. Hort. Cong. (Nice, 1958) Proc. 3: 485-491. 1962.

zone 5b, but not for zone 5a; orchard peaches (*Prunus persica*) are suitable in zone 6b, but will also succeed in those parts of zone 6a that are relatively free of late frosts; Japanese camellia (*Camellia japonica*), Chinese holly (*Ilex cornuta*), and Southern magnolia (*Magnolia grandiflora*) are suitable in zone 7b but doubtful in 7a.

In determining if a certain plant will survive in a given zone, it is necessary to consider factors other than the minimum temperature range of each zone. For example, the temperatures of adjacent zones become increasingly similar near their common boundary. Moreover, there are innumerable island climates that may be considerably milder or colder than the zone average. These islands are especially frequent in hilly or mountainous areas. Mountainous areas on this map are not shown to be as cold as might be expected. The reason for this is that most weather stations from which records were obtained are located in valleys where temperatures tend to be somewhat milder, and where plants are most likely to be cultivated.

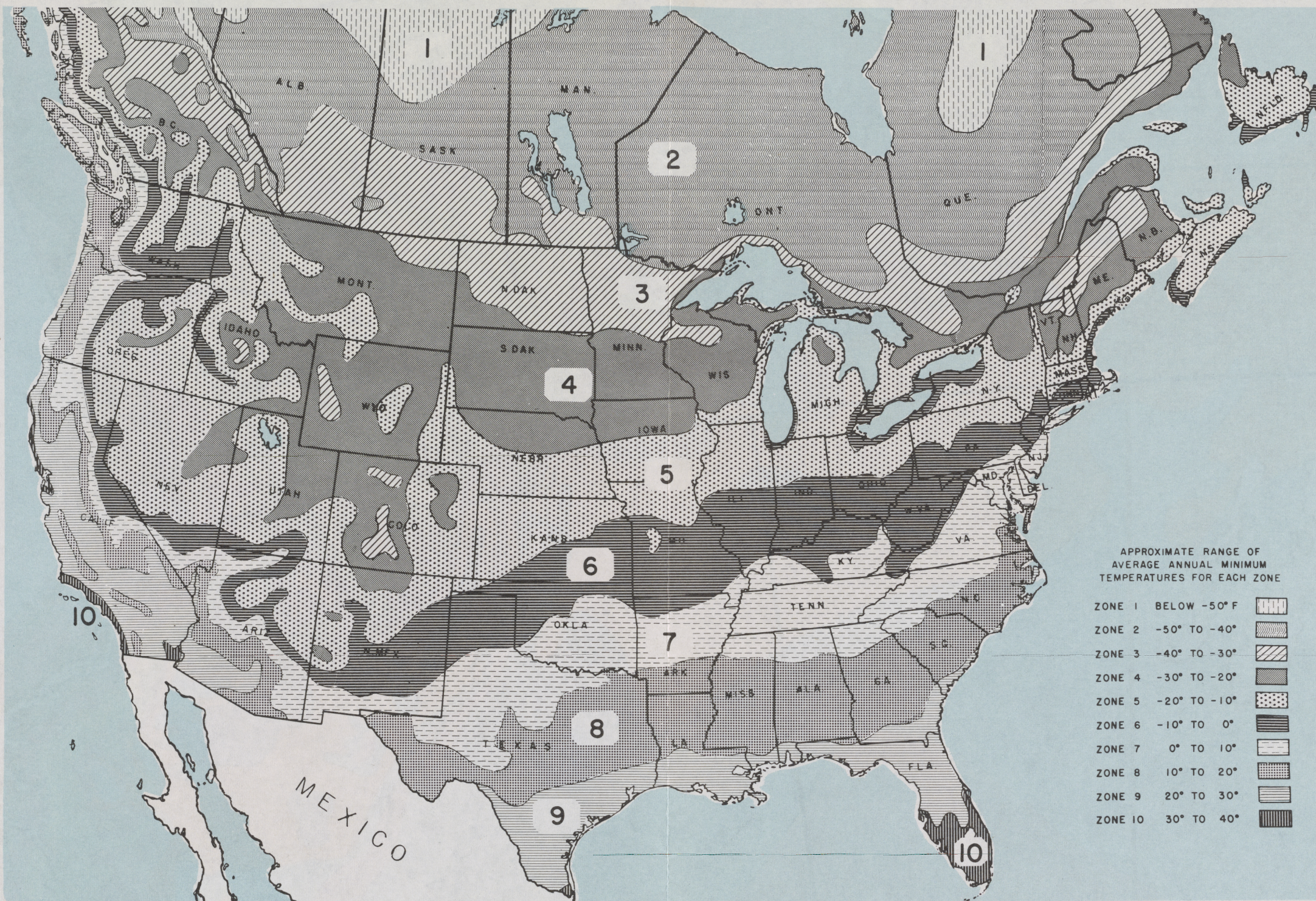
Other plant-growth factors must also be considered. Frost occurrence, seasonal rainfall distribution, humidity, soil characteristics, and duration and intensity of sunlight may bear little relationship to mean winter temperatures. The combined effects of all factors determine true plant adaptability. They would be difficult to depict geographically.

Minimum temperatures, on the other hand, can be readily depicted. They are of prime importance in plant survival. Their effects can seldom be changed by cultural practices.

A plant species that flourishes in one part of a given zone is likely to be adaptable in other parts of the same zone or in a warmer zone. Other growth factors, such as rainfall, soil, and summer heat, have to be reasonably comparable, however, or capable of being made comparable through irrigation, soil correction, wind protection, partial shade, or humidity control. Frost dates, length of growing season, and minimum winter temperatures are among the least readily controlled of the major factors that govern the geographic adaptability of plants.

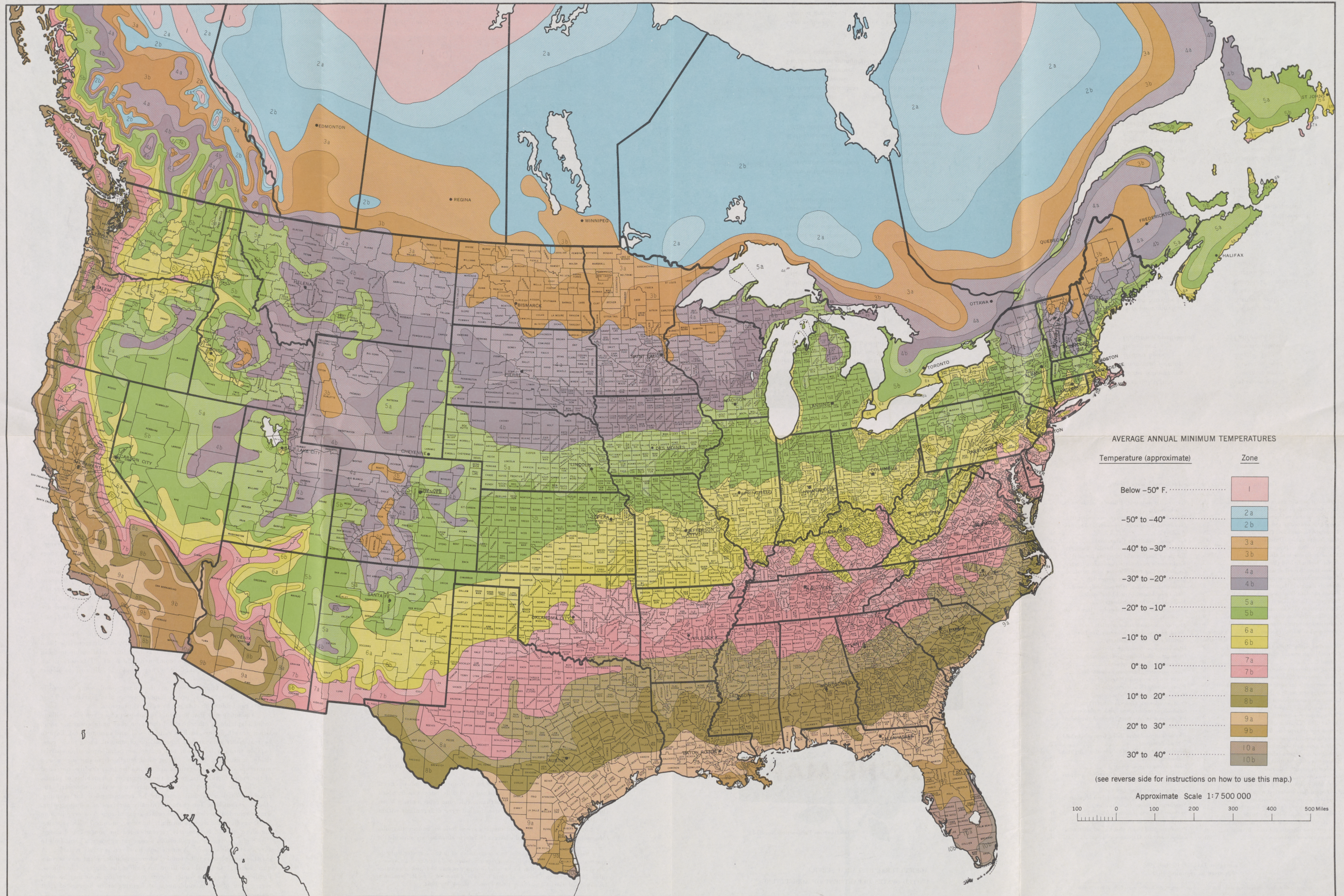
The zone in which a given plant may survive is not necessarily the zone in which it should generally be recommended for planting. *Abelia grandiflora*, for example, usually survives as a low-growing, winter-retarded specimen in the colder areas of zone 6 or even in zone 5. It develops and flowers normally, however, in zone 7. This species, therefore, should be properly recommended for zones 7 and above.

Some gardeners may question a zone rating when a plant fails to survive its first winter. A single test, however, is rarely reliable. A small, young plant may be tender, whereas an older plant may become quite hardy. Cultural conditions may affect the degree of hardiness. Furthermore, no single winter is ever quite average; some may be more severe than others in suddenness of freezing or in degrees of frost registered.



The Zones of Plant Hardiness—This is an adapted version of the color map on the reverse side. It may be useful for small-scale reproduction in books, magazines, and nursery catalogs. This map is not copyrighted, and permission for reproducing it is not required.

PLANT HARDINESS ZONE MAP



AVERAGE ANNUAL MINIMUM TEMPERATURES

Temperature (approximate)

Zone

Below -50° F.

1

-50° to -40°

2a
2b

-40° to -30°

3a
3b

-30° to -20°

4a
4b

-20° to -10°

5a
5b

-10° to 0°

6a
6b

0° to 10°

7a
7b

10° to 20°

8a
8b

20° to 30°

9a
9b

30° to 40°

10a
10b

(see reverse side for instructions on how to use this map.)

Approximate Scale 1:7 500 000

100 0 100 200 300 400 500 Miles

INDICATOR PLANT EXAMPLES

Following are names of representative persistent plants listed under the coldest zones in which they will normally succeed. Such plants may serve as useful indicators of the cultural possibilities of each zone.

	Botanical Name	Common Name
ZONE 1 (below -50° F.)	<i>Betula glandulosa</i> <i>Empetrum nigrum</i> <i>Populus tremuloides</i> <i>Potentilla pensylvanica</i> <i>Rhododendron lapponicum</i> <i>Salix reticulata</i>	Dwarf birch Crowberry Quaking aspen Pennsylvania cinquefoil Lapland rhododendron Netleaf willow
ZONE 2 (-50° to -40° F.)	<i>Betula papyrifera</i> <i>Cornus canadensis</i> <i>Elaeagnus commutata</i> <i>Larix laricina</i> <i>Potentilla fruticosa</i> <i>Viburnum trilobum</i>	Paper birch Bunchberry dogwood Silverberry Eastern larch Bush cinquefoil American cranberry bush
ZONE 3 (-40° to -30° F.)	<i>Berberis thunbergi</i> <i>Elaeagnus angustifolia</i> <i>Juniperus communis</i> <i>Lonicera tatarica</i> <i>Malus baccata</i> <i>Thuja occidentalis</i>	Japanese barberry Russian olive Common juniper Tatarian honeysuckle Siberian crabapple American arborvitae
ZONE 4 (-30° to -20° F.)	<i>Acer saccharum</i> <i>Hydrangea paniculata</i> <i>Juniperus chinensis</i> <i>Ligustrum amurense</i> <i>Parthenocissus quinquefolia</i> <i>Spiraea vanhouttei</i>	Sugar maple Panicle hydrangea Chinese juniper Amur River privet Virginia creeper Vanhoutte spirea
ZONE 5 (-20° to -10° F.)	<i>Cornus florida</i> <i>Deutzia gracilis</i> <i>Ligustrum vulgare</i> <i>Parthenocissus tricuspidata</i> <i>Rosa multiflora</i> <i>Taxus cuspidata</i>	Flowering dogwood Slender deutzia Common privet Boston ivy Japanese rose Japanese yew

ZONE 6 (-10° to 0° F.)

Acer palmatum
Buxus sempervirens
Euonymus fortunei
Hedera helix
Ilex opaca
Ligustrum ovalifolium

Japanese maple
Common box
Winter creeper
English Ivy
American holly
California privet

ZONE 7 (0° to 10° F.)

Acer macrophyllum
Azalea Kurume hybrids
Cedrus atlantica
Cotoneaster microphylla
Ilex aquifolium
Taxus baccata

Bigleaf maple
Kurume azaleas
Atlas cedar
Small-leaf cotoneaster
English holly
English yew

ZONE 8 (10° to 20° F.)

Arbutus unedo
Choisya ternata
Olearia haasti
Pittosporum tobira
Prunus laurocerasus
Viburnum tinus

Strawberry tree
Mexican orange
New Zealand daisy-bush
Japanese pittosporum
Cherry-laurel
Laurestinus

ZONE 9 (20° to 30° F.)

Asparagus plumosus
Eucalyptus globulus
Eugenia paniculata
Fuchsia hybrids
Grevillea robusta
Schinus molle

Asparagus fern
Tasmanian blue gum
Brush cherry
Fuchsia
Silk-oak
California pepper tree

ZONE 10 (30° to 40° F.)

Bougainvillea spectabilis
Cassia fistula
Eucalyptus citriodora
Ficus elastica
Musa ensete
Roystonea regia

Bougainvillea
Golden shower
Lemon eucalyptus
Rubber plant
Banana
Royal palm

Cold Hardiness Ratings for Some Additional Woody Plants

	Zone		Zone
<i>Abeliophyllum distichum</i> (white forsythia)---	5b	<i>Hypericum patulum</i> 'Hidcote' (Hidcote St. Johnswort)-----	6
<i>Acer platanoides</i> (Norway maple)-----	4	<i>Iberis sempervirens</i> (evergreen candytuft) --	5
<i>Aesculus carnea</i> (red horsechestnut)-----	4	<i>Ilex crenata convexa</i> (convexleaf Japanese holly)-----	6b
<i>Araucaria araucana</i> (monkeypuzzle)-----	7b	<i>Jacaranda acutifolia</i> (jacaranda)-----	10
<i>Arctostaphylos uva-ursi</i> (bearberry)-----	2b	<i>Juglans regia</i> (English or Persian Walnut)--	6b
<i>Aristolochia durior</i> (Dutchmans pipe)-----	4b	<i>Juniperus horizontalis</i> (creeping juniper)---	3
<i>Aucuba japonica</i> (Japanese aucuba)-----	7b	<i>Koelreuteria paniculata</i> (goldenrain-tree)---	6
<i>Azalea</i> Indian hybrid (Indian azalea)-----	8b	<i>Laburnum watereri</i> (Waterer laburnum)-----	5b
<i>Azalea</i> Mollis hybrid (Mollis azalea)-----	5	<i>Lagerstroemia indica</i> (crapemyrtle)-----	7
<i>Azalea rosea</i> (roseshell azalea)-----	4	<i>Mahonia aquifolium</i> (Oregon hollygrape)---	5b
<i>Bauhinia variegata</i> (purple orchid tree)-----	9b	<i>Malus arnoldiana</i> (Arnold crabapple)-----	4
<i>Berberis darwini</i> (Darwin barberry)-----	8	<i>Melia azedarach</i> (chinaberry)-----	7b
<i>Betula pendula</i> (European white birch)-----	3	<i>Metasequoia glyptostroboides</i> (Dawn redwood)-----	5b
<i>Bouvardia</i> 'Coral' (Coral bouvardia)-----	9	<i>Myrtus communis</i> (true myrtle)-----	8b
<i>Butia capitata</i> (Pindo palm)-----	8b	<i>Nandina domestica</i> (heavenly bamboo)-----	7
<i>Camellia reticulata</i> (reticulata camellia)-----	9	<i>Nerium oleander</i> (oleander)-----	8b
<i>Camellia sasanqua</i> (sasanqua camellia)-----	7b	<i>Olea europaea</i> (common olive)-----	9
<i>Carya pecan</i> 'Major' (pecan)----- 5 (grows) 6 (fruits)		<i>Osmanthus ilicifolius</i> (holly osmanthus)-----	7
<i>Casuarina equisetifolia</i> (Australian pine)---	9b	<i>Picea abies</i> (Norway spruce)-----	3
<i>Ceanothus impressus</i> (Santa Barbara ceanothus)-----	8	<i>Pieris japonica</i> (Japanese andromeda)-----	6
<i>Cedrus deodara</i> (deodar cedar)-----	7b	<i>Pinus mugo</i> mughus (Mugho pine)-----	3
<i>Cercis chinensis</i> (Chinese redbud)-----	6b	<i>Pinus radiata</i> (Monterey pine)-----	7b
<i>Chamaecyparis lawsoniana</i> (Lawson cypress)	6b	<i>Pinus strobus</i> (eastern white pine)-----	3b
<i>Chamaecyparis pisifera</i> (Sawara cypress)----	5	<i>Prunus yedoensis</i> (Potomac cherry)-----	6
<i>Cinnamomum camphora</i> (camphor tree)-----	9	<i>Raphiolepis indica rosea</i> (pink raphiolepis) --	8
<i>Cistus laurifolius</i> (laurel rockrose)-----	7	<i>Rhododendron</i> 'America' (hybrid rhododendron)-----	5
<i>Cistus purpureus</i> (purple rockrose)-----	8	<i>Rhododendron loderi</i> 'King George' (hybrid rhododendron)-----	8
<i>Cornus alba</i> (Tatarian dogwood)-----	3	<i>Rhododendron</i> 'Purple Splendor' (hybrid rhododendron)-----	7
<i>Cornus kousa</i> (Japanese dogwood)-----	5b	<i>Rosa rugosa</i> (rugosa rose)-----	3
<i>Cunninghamia lanceolata</i> (cunninghamia)---	7	<i>Schinus terebinthifolius</i> (Brazilian peppertree)-----	9b
<i>Cytisus praecox</i> (Warminster broom)-----	6	<i>Sequoia sempervirens</i> (redwood)-----	8
<i>Elaeagnus multiflora</i> (cherry elaeagnus)----	5	<i>Sequoiadendron giganteum</i> (giant sequoia) --	7
<i>Elaeagnus pungens</i> (thorny elaeagnus)-----	7	<i>Stewartia koreana</i> (Korean stewartia)-----	6
<i>Eriobotrya japonica</i> (loquat)-----	8	<i>Syringa vulgaris</i> (common lilac)-----	3b
<i>Euonymus alatus</i> (winged euonymus)-----	3b	<i>Ulmus americana</i> (American elm)-----	2
<i>Euphorbia pulcherrima</i> (poinsettia)-----	10	<i>Viburnum burkwoodi</i> (Burkwood viburnum)	5b
<i>Fatsyhedera lizei</i> (botanical wonder)-----	8	<i>Zelkova serrata</i> (Japanese zelkova)-----	5b
<i>Forsythia ovata</i> (early forsythia)-----	4b		
<i>Forsythia suspensa</i> (weeping forsythia)-----	5b		
<i>Fremontia mexicana</i> (flannel bush)-----	9		
<i>Ginkgo biloba</i> (ginkgo, maidenhair-tree)----	5		
<i>Hibiscus rosa-sinensis</i> (Chinese hibiscus)---	9b		
<i>Hibiscus syriacus</i> (shrub althea)-----	5b		

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